

# FACT SHEET

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## THE ROAD TO BEEF CARCASS DESIRABILITY

Frank A. Orts • Extension Meats Specialist • Texas A&M University

The ultimate goal of any beef cattle enterprise is eventual beef production for the consuming public. Quantity of edible portion and lean quality are the basic attributes studied when considering carcass merit. The relative quality and quantity value of edible portion are subject to change. In most cases the ratio of lean to fat and bone or edible portion is more important to the retailer and to Mrs. Housewife than quality, especially when containing quality necessary to qualify for the choice grade.

### CARCASS EVALUATION

Carcass evaluation is the technique by which quantity and quality components are measured. Evaluation methods discussed in this publication were chosen because of their wide use by beef cattle producers and their ease of application. There are other excellent methods and techniques available. However, a unified approach to beef carcass evaluation indicates that the methods and techniques recommended here be used as a base in order to allow for direct comparison in the evaluation of breeding stock. Use of other methods such as breed association carcass merit programs is not discouraged.

### BASIC FACTORS OF CARCASS DESIRABILITY

*Quantity or cutability* is referred to as the amount of salable meat the carcass will yield, particularly the amount of high value boneless, closely-trimmed, retail cuts derived from the chuck, loin, rib and round (rump on) of a beef carcass.

It is recommended that the USDA yield grades be used as a basis for the evaluation of the quantity of salable steak and roast meat in the carcass.

There are five USDA yield grades numbered 1 through 5. Yield grade 1 carcasses have the highest percentage of boneless, closely-trimmed, salable meat from the chuck, loin, rib and round, while yield grade 5 carcasses have the lowest percentage.

The USDA yield grades are based on four factors:

- Hot carcass weight — weight recorded on the kill floor immediately before washing and shrouding of the carcass and after the hide and viscera have been removed.
- Ribeye area at the twelfth rib — only the one large muscle displayed upon separation of the carcass between the twelfth and thirteenth rib.
- Fat thickness at the twelfth rib — measured at a point three-fourths of the distance down the ribeye from the split backbone and at right angles to the outside of the fat and to the edge ribeye.
- Estimated percent kidney, pelvic and heart fat — this is an estimate of the ratio of fat lying around the kidney, in the pelvic cavity and fat left in the chest cavity which varies greatly between packing plants due to removal on the kill floor, to carcass weight. The average kidney fat percentage found in most beef carcasses is approximately 3½ percent with a range of 1½ to 6 percent.

Of the four factors shown above which determine yield grade, only ribeye area is a positive factor or one which contributes to improving the yield grade. The other three are detrimental to yield grade or tend to increase it. The greatest influence on yield grade is exerted by the fat thickness at the twelfth rib.

In most marketing situations yield grades are expressed as whole numbers; however, for carcass evaluation they are expressed in tenths of the grade.

In the marketing of carcasses or live cattle, a carcass is a yield grade 2.0 whether it is a 2.0 or a 2.9. A 2.9 yield grade indicates that a carcass is one tenth better than a 3.0; however, it is still a yield grade 2. As mentioned earlier, yield grade can also be expressed as a percentage. This percentage estimates the percent closely-trimmed, (all fat in excess of  $\frac{3}{8}$  inch trimmed off) boneless, retail cuts from the *round, loin, rib* and *chuck*. Even though this represents on the average only about 50 percent of the carcass weight, it does represent approximately 85 percent of the total carcass value.

The percentage figure is commonly referred to as cutability. Various cutability figures which correspond to the yield grades are:

Yield Grade	Percent Boneless, Closely-Trimmed, Retail Cuts from the Chuck, Loin, Rib and Round
1.0	54.6
1.1	54.4
1.2	54.2
1.3	53.9
1.4	53.7
1.5	53.5
1.6	53.3
1.7	53.0
1.8	52.8
1.9	52.6
2.0	52.3
2.1	52.1
2.2	51.9
2.3	51.6
2.4	51.4
2.5	51.2
2.6	51.0
2.7	50.7
2.8	50.5
2.9	50.3
3.0	50.0
3.1	49.8
3.2	49.6
3.3	49.3
3.4	49.1
3.5	48.9
4.0	47.7
4.5	46.6
5.0	45.4
5.5	44.3

The formula for calculating the estimated percent boneless, closely-trimmed, retail cuts obtainable from the chuck, loin, rib and round (cutability) is: Percent =  $51.35 - 5.784 \times \text{single fat thickness at the twelfth rib} - 0.462 \times \text{estimated percent kidney, pelvic and heart fat} + 0.740 \times \text{area of ribeye in square inches} - 0.0093 \times \text{hot carcass weight in pounds}$ .

#### PRE-SLAUGHTER GROWTH RATE

Pre-slaughter growth rate is an extremely important part of all performance programs. However, most measures of pre-slaughter growth rate do not measure the composition of this growth. In

order to measure the carcass composition in terms of growth rate, express it as pounds of boneless, closely-trimmed, retail cuts per day of age. This is a much more meaningful figure than the chilled carcass weight per day of age which is quoted very widely because this method does not report the carcass weight composition.

An example of pounds of boneless, closely-trimmed cuts per day of age is:

Pounds of boneless, trimmed, retail cuts/day of age = carcass weight  $\times$  cutability (in percent from the above formula)  $\div$  age in days.

For example:

600 pound carcass

52.3 percent boneless, closely-trimmed, retail cuts (cutability)

365 days of age or using the above formula

$600 \times 52.3 = 314 \div 365 = .86$  pounds of boneless, closely-trimmed, retail cuts per day of age

#### QUALITY

Quality refers to the overall estimated palatability of the carcass' edible portion (lean meat). The USDA quality grade (conformation excluded) is recommended as the base for quality evaluation. The USDA quality grades are prime, choice, good, standard, commercial, utility, cutter and canner. Normally, the last four grades are found in older animals such as cows and not steers and heifers normally sold on the market. These grades are determined by the evaluation of certain carcass characteristics. These characteristics (excluding conformation) are:

Maturity — from bone development

Marbling

Texture of lean

Color of lean

Firmness of lean

} in ribeye muscle

Once the quality grade is determined it is reported as a full-grade range such as choice, good, etc. or in some cases reported by a third of a grade. It is desirable in numerous cases to independently record the score for one or more of the characteristics which make up the grade, especially maturity, degree of marbling, color and firmness of lean.

Low choice quality has been recommended as a minimum goal in sire evaluation programs. Further desirable measures of palatability can be employed such as the Warner-Bratzler shear test and taste panels. However, have both measures



conducted by an adequately equipped university meats laboratory.

### **USING CARCASS EVALUATION**

Not all beef cattle producers need or want complete carcass evaluation data. Feeders evaluating their buying and management practices may only need the raw quality or yield grades. Commercial producers checking their breeding programs may need the quality grade by thirds and the yield grades by tenths. In extensive sire evaluation programs and other more sophisticated programs, the breeder can record and use all data available for both yield and quality grade such as fat thickness, ribeye area, percent heart, pelvic and kidney fat and all quality characteristics.

### **OBTAINING CARCASS EVALUATION DATA COLLECTION ASSISTANCE**

Plan well in advance of slaughter if desiring carcass data. Individual cattle identification is a must especially if more than one bull is involved and individual steer data are desired. Contact the local county Extension agents about the possibility of obtaining Extension assistance with data collection or contact the USDA grading service regional office.

If desiring to collect carcass data on steers also contact the packinghouse. Make arrangements for the data collection and agree on a sale price for the carcasses or live cattle.

### **USDA'S CARCASS EVALUATION SERVICE**

This service is provided on a fee basis and may be requested from any USDA grading regional office. The fee varies depending upon the amount of information requested and expenses incurred by the grader such as travel.

After the carcasses are chilled, the grader records the information requested for each animal on a USDA form which is forwarded to the producer or feeder requesting the service.

### **BREED ASSOCIATION OR PERFORMANCE REGISTRY INTERNATIONAL CARCASS DESIRABILITY PROGRAMS**

Several breed associations and Performance Registry International have a carcass desirability program and purebred breeders are encouraged to use this service. These programs differ slightly but most have the same goal of producing a carcass attuned to the desires of the meat industry.

### **HELPFUL PUBLICATIONS**

#### **USDA Publications:**

- Beef Carcass Yield Grade Finder
- Official Standards for Grades of Carcass Beef
- USDA Yield Grades for Beef

The above publications may be obtained by writing to USDA: Consumer and Marketing Service; Livestock Division; Standardization Branch; Washington, D. C. 20250.

- Recommended Guides for Carcass Evaluation and Contests — this publication may be obtained at the cost of \$1 by writing the American Meat Science Association, 36 S. Wabash Avenue, Chicago, Illinois 60603.

**REFERENCES:** Guidelines for Uniform Beef Improvement Programs, USDA, April, 1970.

Under the terms of the act, the United States Department of Agriculture is authorized to conduct research and to disseminate the results thereof. The information obtained from such research is to be made available to the public. The act also provides for the establishment of a cooperative extension work in agriculture and home economics, Texas A&M University and the United States Department of Agriculture cooperating. Distributed in furtherance of the Acts of Congress of May 8, 1914, as amended, and June 30, 1914. 10M-12-70, Reprint

# UNITED STATES DEPARTMENT OF AGRICULTURE BUREAU OF MEAT INDUSTRY

Grade	Yield
1	5.1
2	4.8
3	4.5
4	4.2
5	3.9
6	3.6
7	3.3
8	3.0
9	2.7
10	2.4
11	2.1
12	1.8
13	1.5
14	1.2
15	0.9
16	0.6
17	0.3
18	0.0

For further information, contact the Bureau of Meat Industry, United States Department of Agriculture, Washington, D.C. 20250. The cost of this publication may be obtained by writing to USDA, Consumer and Marketing Service, Washington, D.C. 20250. The above information may be obtained by writing to USDA, Consumer and Marketing Service, Washington, D.C. 20250. The cost of this publication may be obtained by writing to USDA, Consumer and Marketing Service, Washington, D.C. 20250. The above information may be obtained by writing to USDA, Consumer and Marketing Service, Washington, D.C. 20250.

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